The Plague is treated by Dr. Payne. The bacteriology of the disease, in the light of Yersin and Kitasato's researches, is fully discussed, and the possibility of treatment by antitoxine (Calmette). Relapsing Fever is dealt with by Dr. Rabagliati; the bacteriology of the subject being from the pen of Dr. Westbrook. With this last article Volume i. closes. At the end of each monograph there is a list of references, which are paragraphed, according to the sub-section of the article to which they refer. An accurate and extensive index of authors and subjects greatly facilitates the use of the book.

An idea of the labour requisite to the successful editing of a work like the one before us can only be formed by the experienced few who have accomplished it. To Prof. Allbutt are due the thanks and congratulations of cosmopolitan Medicine for having produced a work which in fulness, accuracy and interest, leaves nothing to be desired. F. W. T.

A TEXT-BOOK OF EXPERIMENTAL PHYSICS.

Lehrbuch der Experimental Physik. Von Eduard Riecke. Erster Band. Mechanik, Akustik, Optik. Pp. xvi + 418. (Leipzig: Verlag von Veit and Co., 1896.)

THE author, who is Professor of Physics in the University of Göttingen, is well and favourably known for his work in several departments of physical science, and the text-book he has written possesses the qualities we should expect to find in the work of one who is actively engaged not only in teaching physics, but in advancing the subject by research.

After an introduction on physical phenomena, physical hypotheses and theories, and elementary measurements such as those of angle, length, mass, and time, the treatise enters on the subjects of mechanics and acoustics, to which the first part of the present volume is devoted. This occupies pp. 20–261, leaving pp. 262-418 for the discussion of optics.

In opening his dynamical treatment, the author does not attempt to deal with the vexed questions of the foundations of dynamics, a procedure which is perhaps the best in the interests of beginners. The thoughtful student will be confronted with the fundamental difficulties soon enough, and according to his own ability and the skill of his dynamical adviser will be his relief from the serious mental embarrassment which he will inevitably experience. The thoughtless student need not be considered.

The author postpones the consideration of mass, and defines the unit of weight as the weight of a cubic centimetre of distilled water at maximum density under atmospheric pressure, which he calls a *gramme-gewicht.* We differ from the author as to this being the *definition* of the unit of weight in the metric system. Surely that unit is the weight of the standard kilogramme itself, or of $\frac{1}{1000}$ part of it. By the statement given the unit of weight is not immediately connected with the standard piece of matter; though it is no doubt very nearly $\frac{1}{1000}$ of the weight of the standard kilogramme. The unit of weight is, however, made the weight of a unit of mass and is therefore, strictly speaking, a variable unit; it is used throughout the treatment of the statics of rigid bodies, with which the dynamical portion of the book begins.

The method adopted thus differs from that now usually followed, in English books at least, by considering a vertical string or bar which supports a body as stretched by a force equal to the weight of the body, as measured by the number of cubic centimetres of distilled water at maximum density which will just equilibrate the body in an accurate balance. Thus, so far as statics is concerned, a preliminary kinetic definition and discussion of force and the laws of motion are dispensed with.

Whatever opinion may be held as to the merits or demerits of this mode of presenting the subject of statics, there can be no question of the importance of referring the student on every possible occasion for illustration of principles and theorems to the great practical applications of dynamics that we have in abundance in engineering structures, and of the use where possible of graphical methods. This is an aim which the author keeps well in view, though in order to proceed to the consideration of stretching force and thrust, and ties and struts, it does seem a little hasty to dismiss the parallelogram of forces with a mere experimental proof by means of strings and weights.

The discussion of the kinetics (*dynamics* the author calls it) of solid bodies follows. This has many points of excellence. But we must rather demur to the comparison of the absolute and technical units, given at p. 67. Thus it is stated—

Absolute.	*Technical.*
Unit of mass equal to the mass of a gramme.	Unit of force equal to the weight of a gramme at latitude 45°.
Unit of force equal to the weight of $\frac{1}{981}$ gramme at latitude 45°.	Unit of mass equal to the mass of 981 gramme weights.

Whatever the somewhat disputed relative merits for different purposes of the absolute and technical system of units may be, it is universally admitted that the absolute C.G.S. unit of force is that force which gives a mass of one gramme an acceleration of 1 centimetre per second per second. To define it, or state its value as above, is to give no doubt a constant unit of force (on the supposition that gravity is constant at latitude 45°), but one differing perceptibly from that usually defined as the absolute unit, since the value of g at latitude 45° at mean sea-level is approximately 980·61 in centimetre second units. The great beauty of the absolute system as given by Gauss, surely lies in the fact that the fundamental units of length, mass, and time do all for us, and we have, so far as the *definition* of dynamical units is concerned, nothing whatever to do with gravity.

The proper definition of the unit of force it must be stated, however, is given *below* this "Gegenüberstellung" of units, so that the author probably does not offer the statement in the table as other than a comparison of values of units; but it is well to give first the definition, and rub it in with plenty of illustration. Only after the student has become perfectly familiar with the system of

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units he has been introduced to, is it safe to bring another under his notice.

Many interesting cases of motion are well expounded and illustrated by diagrams, for example the motion of a pendulum with a gyrostat in its bob (a case of great importance in other branches of physics), and the precession of the equinoxes.

The statics and kinetics of fluids are next dealt with, and, as was to be expected, fluid motion is well attended to. Wave motion of a fluid and the principle of Huyghens are here discussed and well illustrated graphically. Then follows a wonderfully complete account, for the space devoted to it, of molecular phenomena of solids and fluids, including a sketch of the kinetic theory of gases.

The second half of the book, which deals with acoustics and optics, we have not space to speak of in any detail. Throughout we have clear description of phenomena, of apparatus, and of experimental processes, always with neat and truthfully-drawn diagrams. There is necessarily very little in the way of mathematical exposition of these subjects, but the results of mathematical and experimental investigation are clearly stated, and the book cannot but form an exceedingly useful introduction to an extended course of physical study, such as that for which one of the more elaborate Lehrbücher, which have lately appeared in Germany, might form a basis. It is very clearly printed, and, what is a great thing in a text-book, the numerous cuts have been very well engraved and printed.

A. GRAY.

TRAVELS AMONG THE HAUSA.

Hausaland, or Fifteen Hundred Miles through the Central Soudan. By Charles Henry Robinson, M.A. Pp. 304. Map and illustrations. (London: Sampson Low, Marston, and Co., 1896.)

MR. J. A. ROBINSON, the brother of the author of the book before us, died at Lokoja on the Niger in 1891, while engaged in the study of the Hausa language, and in his memory the Hausa Association was formed in the same year with a view to carry on the work. Mr. C. H. Robinson was selected by the Association as their first "Hausa Student," and he left England at the end of April 1893, to make acquaintance with the language, and also to learn Arabic. Instead of proceeding directly to the land of the Hausas, the climate of which at the best is very trying for Europeans, he went successively to Tripoli and Tunis, where he had opportunities of conversing with many of the Hausa pilgrims on their way from the interior of the Sudan to Mecca, and with any number of Hausa slaves.

Equipped by preliminary training in the language, and accompanied by two friends, Dr. T. J. Tonkin and Mr. John Bonner, Mr. Robinson reached Lokoja, at the confluence of the Niger and Benue, in August 1894; and, after wearisome delays in obtaining carriers, set out for Kano, the commercial capital of the Hausa states. They travelled up the Benue to Loko, then struck northwards by land through Kaffa and Zaria, and reached Kano on December 23. Here the party stayed for rather more than three months, engaged in diligent study, and then returned to the Niger and to Europe.

Hausaland is not a defined geographical area, but a group of native states occupying the fertile region of the Western Sudan between the territory of the Royal Niger Company (to which they are tributary) and the Sahara desert. Sokoto is the predominant state, but the chief town of the Hausas is Kano, a trade-centre of such importance that Mr. Robinson does not hesitate to dub it the "Manchester of the Soudan." The town is described in some detail, and this description is perhaps the most important feature of the book, which in other parts suffers from "padding," including long extracts from various writers on non-essential subjects. Kano is estimated to contain about 100,000 inhabitants; it manufactures much cloth, which is largely exported, and may be purchased in Alexandria, Tunis, or Lagos, so widely are its qualities appreciated. The markets also contain European goods, which are still, for the most part, brought across the Sahara from Mediterranean ports. The Hausas are born traders, and having acquired Mohammedan education, are by no means to be viewed as savages. They are, however, inveterate slave-traders; and Mr. Robinson is of opinion that this trade cannot be seriously combated until a satisfactory currency and mechanical means of transport are introduced. At present slaves are the larger, and cowries the smaller, units of value; and as a slave is worth several hundred thousand cowries, the carriage of his value in these shells would tax the resources of any caravan. There is one coin which passes current through the whole of Northern Africa—perhaps the last in Europe which would occur to any one set to guess its nationality and date—the silver Austrian thaler coined in 1780 during the reign of Maria Theresa. Mr. Robinson urges a large importation of these coins as a measure to promote trade and discourage slavery. He has shown himself to be a diligent student and a good observer, although a somewhat diffuse writer, and the suggestion is worthy of consideration.

In the preface we are told that the Royal Geographical Society's system of spelling place-names has been followed; but this is only done in part. The French transliterations are used in some cases, and also other forms—as, for example, Abutshi, Bornou, Gandja, Soudan, Tchad; where the system referred to would require—Abuchai, Bornu, Ganja, Sudan, Chad.

It is to be hoped that the efforts of the Hausa Association will not be allowed to cease for want of money; for Mr. Robinson's linguistic work is of real value, and its importance will appear more fully when the facsimiles and translations of the Hausa MS. which he has brought home, together with his dictionary and grammar of the language, are published.

OUR BOOK SHELF.

Practical Mechanics, applied to the Requirements of the Sailor. By Thomas Mackenzie, Master Mariner, F.R.A.S., &c. Pp. xii + 175. (London: Charles Griffin and Co., Ltd., 1896.)

THIS book is one of a very useful series on nautical subjects, published in order to meet a desire on the part of the officers of the Mercantile Marine to obtain a more scientific insight into the principles of their profession.

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